5:15

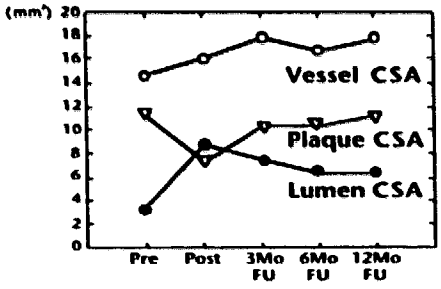
866-6 Time Course of Neointimal Proliferation and Arterial Remodeling After Directional Atherectomy: Serial Ultrasound Observations From Adjunctive Balloon Angioplasty Following Coronary Atherectomy Study

H. Hosokawa, O. Kato, H. Tamai, T. Yamaguchi, T. Aizawa, T. Suzuki, ABACAS Investigators. *National Toyohashi Higashi Hospital, Toyohashi, Japan*

To assess the mechanisms of late arterial response to directional atherctomy (DCA), we analyzed serial intravascular ultrasound (IVUS) measurements in the subset of Adjunctive Balloon Angioplasty Following Coronary Atherectomy Study (ABACAS).

Methods: In 39 pts out of 214 pts, who were randomized to DCA alone or to DCA with adjunctive PTCA, prospective serial IVUS was performed at pre and post-procedure, and at 3, 6, 12-month follow-up.

Results: Vessel area increased gradually through the follow-up period, while decreasing at 6 months temporarily. Plaque area increased rapidly up to 3 months and later on little slow increase occurred. As the result, lumen area decreased until 6 months and plataued through 12 months.



Conclusion: Long-term vascular response after directional atherectomy consists of early rapid and late slow neointimal proliferation and gradual compensatory enlargement of the vessel.

867 New Surgical Techniques: Partial Left Ventriculectomy and Transmyocardial Laser Revascularization

Tuesday, March 31, 1998, 4:00 p.m.–5:30 p.m.
Georgia World Congress Center, Room 261W

4:00

867-1 Autopsy Findings in Early and Late Post Operative Death of Partial Left Ventriculectomy

P.M. Cury, M. de L. Higuchi, P.S. Gutierrez, L. Felipe, P. Moreira, E.A. Bocchi, N. Stolf, G. Bellotti, A.D. Jatene. *Heart Institute, São Paulo, Brazil*

Background: Partial left ventriculectomy (PLV) is a new surgical procedure which has been proposed for the treatment of heart failure in dilated hearts. However, the morbidity and mortality have been considered too high in most serial cases. The autopsy findings may contribute to understand the reasons of such bad outcome.

Methods: In our Institution, 34 patients were submitted to PLV. They were followed for mean 10.5 months and 13 of these patients died. Actuarial survival was 57% at one year of follow up. The present study analyses in detail the necropsy findings of 11 cases (10 male, age varying from 33 to 58 years old) in order to provide data that could be associated to the unsuccessfulness of the PLV.

Seven patients presented immediate post-operative death (less than 30 d), four due to cardiogenic shock, two with arrhythmia, and the last one with coagulopathy. Four patients had late post operative death (from 36 to 120 d), one due to arrhythmia (ventricular tachycardia) and three to cardiogenic shock.

All hearts exhibited myocardial infarction adjacent to the surgical incision, measuring from 3 to 6 cm and generally extending to the papillary muscles. The three patients that died due to arrhythmia presented infarction in both papillary muscles. A 2 cm viable zone of myocardium was observed adjacent to the mitral annulus. Severe diffuse pericardial hemorrhage was found in one patient who died due to arrhythmia. In two cases of late death due to cardiogenic shock the necropsy revealed severe pericardial hematoma juxtaposed to the surgical incision, compressing the myocardial wall which was thinned due to ischaemic lesions..

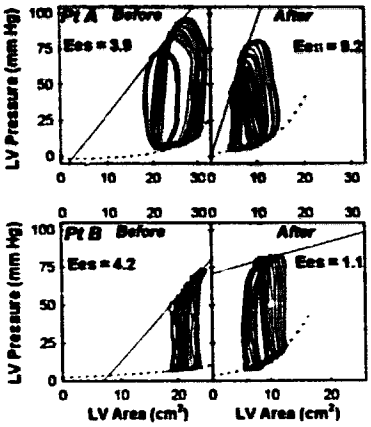
Conclusions: Pericardial hemorrhage and myocardial infarction, mainly in the papillary muscles, are complications of the PLV and could be associated with the development of arrhythmias or heart failure in the early or late post operative period.

4:15

867-2 Heterogeneous Immediate Effects of Partial Left Ventriculectomy on Cardiac Performance

J. Gorcsan, III, A.M. Feldman, W.A. Mandarino, R.L. Kormos, R.J.V. Batista. *Hospital Angelina Caron, Campina Grande do Sul, Brazil; University of Pittsburgh, Pittsburgh, PA, USA*

Partial left ventriculectomy (PLV) for pts with severe heart failure has been associated with improvements in LV ejection fraction (EF), although pt outcome has been variable. To assess its immediate effects on LV performance, 8 consecutive pts were studied using high fidelity pressure catheters and TEE automated border detection. Diseases were: idiopathic dilated cardiomyopathy in 5, Chagas disease in 1, aortic regurgitation in 1, and ischemic cardiomyopathy in 1. Pressure-area relations were acquired before and after PLV. One pt. with intraoperative myocardial infarction died. In the remaining 7 pts, LV volume decreased from 200 ± 6 to 89 ± 17* ml and EF consistently improved from 12 ± 3 to 41 ± 8* % (*p < 0.01). However heterogeneous immediate results in LV end-systolic elastance (Ees): 5.2 ± 4.6 to 4.6 ± 2.5 mmHg/cm^2) and preload recruitable stroke work: 31.9 ± 10.3 to 36.6 ± 19.3 mmHg were observed (p = n.s.). LV stiffness increased from 0.11 ± 0.03 to 0.17 ± 0.07* mmHg/cm^2 (*p < 0.05).



Conclusion: PLV is associated with immediate increases in EF. However, LV stiffness increases and heterogeneous effects on systolic performance occurred. Further study of these effects in relation to patient outcome is warranted.

4:30

867-3 Improved Regional Blood Flow and Wall Motion six Months Following Transmyocardial Laser Revascularization

R.M. Reul, S.J. Ferzoco, U. Sayeed-Shah, R.G. Laurence, T. Aretz, S.C. Reimold, S.F. Aranki, L.H. Cohn. *Brigham and Women's Hospital, Boston, MA, USA*

Background: Transmyocardial laser revascularization (TMR) relieves angina in patients not candidates for conventional revascularization. The mechanism however, remains controversial. To evaluate the functional effects of TMR, we studied regional blood flow, vascular density, and wall motion in a porcine model of chronic ischemia.

Methods: Ameriod constrictors were placed around the left circumflex coronary artery in 10 pigs. The TMR-group (n = 5) underwent TMR of the area at risk using a carbon dioxide laser 1.5 months later and controls (n = 5) had ameriods without TMR. The area at risk was studied with high resolution epicardial color Doppler echocardiography 7.5 months after ameriod and analyzed by a blinded observer. A vascularity score (VS) was used to describe blood flow in vessels >0.7 cm in diameter: 0-normal, 1-hypokinetic,

	Median VS	Median WMS	Mean#Vessels/Section
TMR-group	3 (range 3–4)	0 (range 0)	4.3 ± 0.15
Controls	1 (range 1–2)	1 (range 1–3)	3.1 ± 0.14
P-value	<0.001	<0.01	<0.0001

2-akinetic, 3-dyskinetic. Serial sections of each heart were analyzed histologically and the large (>0.7 cm) blood vessels/section counted by a blinded observer.

Results: see Table.

Conclusion: TMR improves myocardial perfusion over a period of 6 months by inducing the development and utilization of large collateral blood vessels to a greater extent than ischemia alone.

4:45

867-4 The Impact of Laser Transmyocardial Revascularization on Indices of Ventricular Repolarization

F.S. Malik, M.R. Mehra, A. Ali, H.O. Ventura, D.D. Stapleton, J.L. Ochsner, F.W. Smart. *Ochsner Medical Institutions, New Orleans, Louisiana, USA*

Background: QT dispersion (QTd), a measure of inhomogeneity of ventricular repolarization, has been documented to increase in the presence of myocardial ischemia. Laser transmyocardial revascularization (LTMR) is a unique therapeutic option for nonrevascularizable coronary artery disease. We investigated the impact of LTMR on indices of QTd in nonrevascularizable coronary artery disease.

Methods: Electrocardiograms in 10 patients (mean age 54 ± 3 years, EF >40, anginal class IV) with coronary artery disease were assessed prior to and 12 weeks post LTMR. QT corrected for heart rate (QTc) were measured in each electrocardiogram, and repolarization dispersion (Qtcd) was measured by subtracting the shortest from the longest QTc. All measurements were performed manually by two observers blinded to timings of the electrocardiogram, using a precision ruler on a 12-lead standard electrocardiogram at 25 mm/sec paper speed.

Results: Anginal class improved in all patients. Medications remained unchanged (beta blockers decreased in two patients). Improvement in angina was accompanied by significant reductions in QTcd in all patients (see table).

	Pre-LTMR	Post-LTMR	P Value
Anginal class	4	2.6	<0.01
LVEF %	45 ± 3	44 ± 2	NS
QTcd (msec)	101 ± 25	63 ± 21	<0.001
JTcd (msec)	101 ± 23	38 ± 13	<0.001
QTcd (CAV)	104 ± 29	53 ± 7.5	<0.001

Conclusion: Improvement in ischemic burden by LTMR in non-revascularizable coronary artery disease is accompanied by reduction in inhomogeneity of ventricular repolarization.

5:00

867-5 Transmyocardial Laser Revascularization Increases Dobutamine-Induced Angina Threshold in Patients With Refractory Angina

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Background: Transmyocardial laser revascularization (TMR) is a promising new treatment for the relief of angina in patients refractory to conventional medical and surgical therapy. Previous clinical trials utilizing TMR have reported subjective improvement in Canadian Cardiovascular Society (CCS) anginal class, however, there are few objective data on changes in angina threshold with positive inotropic stress testing. We examined the effect of TMR (CO_2 laser) on angina threshold during maximal dobutamine stress echocardiography (DSE) and correlated these data with clinical CCS angina class.

Methods: Eight patients (64 ± 11 yrs) underwent DSE pre-TMR, as well as 3 and 6 months post-TMR. Angina threshold was measured by the dobutamine dose at onset of angina (D-angina) during a graded infusion of dobutamine up to 40 mcg/kg/min.

Results: D-angina increased incrementally after TMR and reached statistical significance by 6 months compared to pre-TMR. In addition, mean CCS angina class improved both at 3 months and 6 months:

	CCS class	p value	D-angina (mcg/kg/min)	p value
Baseline	3.38 ± 0.26	-	25 ± 3	-
3 mo. TMR	1.86 ± 0.28	0.004	33 ± 3	0.14
6 mo. TMR	1.62 ± 0.28	0.001	37 ± 7	0.05

Conclusions: Both subjective and objective measures of angina threshold are significantly improved after TMR, substantiating the efficacy of this modality for the relief of refractory angina.

5:15

867-6 Measurement of Myocardial Blood Flow Using Positron Emission Tomography Before and After Transmyocardial Revascularization

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Background: Transmyocardial revascularization (TMR) is a new procedure under evaluation for treating patients with advanced coronary disease. Left ventricular transmural channels are created by a CO_2 laser. We used positron emission tomography (PET) with ^{15}O labelled water to study the effect of TMR on myocardial blood flow (MBF).

Methods: seven patients underwent PET scans on two different occasions: 1 week pre- and 52 ± 19 days post-TMR. On each study day MBF (mean ± SD) was measured at rest and during maximal i.v. dobutamine infusion. To account for differences in cardiac work both resting and dobutamine MBF were corrected for the prevailing heart rate-systolic pressure product (RPP).

Results: RPP was comparable both at rest (6496 ± 1626 pre-TMR and 6348 ± 1672 post-TMR) and during stress (12604 ± 4060 pre-TMR and 13528 ± 3929 post-TMR). In non-lasered regions, resting MBFcor was 0.69 ± 0.26 ml/min/g pre-TMR and 0.82 ± 0.46 ml/min/g post-TMR ($p < 0.05$); during stress, MBFcor was 1.47 ± 0.52 ml/min/g pre-TMR and 1.79 ± 0.94 ml/min/g post-TMR ($p < 0.02$). In lasered regions, resting MBFcor was 0.80 ± 0.27 and 0.97 ± 0.42 ml/min/g pre- and post-TMR respectively ($p < 0.02$); during stress MBFcor was 1.57 ± 0.54 ml/min/g pre-TMR and 1.56 ± 0.95 ml/min/g post-TMR (p = ns).

Conclusion: Corrected myocardial blood flow (MBFcor) increased both at rest and during stress in non-lasered regions in the first three months following TMR whereas in lasered regions MBFcor was increased at rest but not during dobutamine stress.

868 Diagnosis and Physiology of Syncope

Tuesday, March 31, 1998, 4:00 p.m.–5:30 p.m.
Georgia World Congress Center, Room 267W

4:00

868-1 A Comparison of Success Rates of Internists and Cardiologists in the Investigation of Syncope in Hospitalized Patients

M.R. Mansoor, A. AlKeylani, D. Waters, J. Kluger. *Hartford Hospital, and the University of Connecticut, Hartford, CT, USA*

Hospitalizations to find a cause for syncope represent a major healthcare expense and yet are usually unsuccessful. We compared the performance of internists and cardiologists in the investigation of syncope in 362 pts admitted to our hospital with this diagnosis in 1995. The 97 pts with an obvious cause on admission were excluded; of the remaining 265 pts, 151 were managed by cardiologists and 114 by internists.

Results: Overall, cardiologists found a cause for syncope in 53 of 151 pts compared to 25 of 114 by internists (35% versus 22%, p = 0.02). As shown in the table, "neurology" tests had an extremely low diagnostic yield. The proportion of "cardiology" tests that revealed the diagnosis was 12% with Holter, 30% with EP study and 36% with tilt testing. Internists ordered significantly fewer cardiology tests and more neurology tests:

Proportion of Patients Tested and Abnormality Rate:

Test	Tilt	EPstudy	Holter	Echo	HeadCT	EEG	CarDop
Int.	1%*	1%*	18%*	30%*	40%†	15‡	26%
Card.	16%	13%	37%	59%	25%	7%	18%
Abn.	36%	30%	12%	15%	6%	0	0

EEG = Electroencephalogram; CarDop = Carotid Doppler Int. = Internist; Card. = Cardiologist; * p = 0.001; † p = 0.01; ‡ p = 0.05.

Conclusion: In patients hospitalized with syncope of unknown origin cardiologists are more likely than internists to find the cause. They succeed because they order fewer neurology tests, where the yield is very low, and more cardiology tests, which are more often diagnostic. Cardiologists success rate, 35%, remains frustratingly low.

4:15

868-2 Initial Experience With an Insertable Loop Recorder in Patients With Recurrent Unexplained Syncope

A. Krahn, G. Klein, R. Yee. *For the Reveal Investigators, University of Western Ontario, London Ontario, Canada*

Background: A symptom-rhythm correlation is often difficult to obtain in pa-